

### REMARKS:

Claims 1-13 are pending in this application.

Applicants have amended the specification to refer to a related application.

The Examiner has indicated that claims 1-13 are rejected under 35 U.S.C. § 112, second paragraph. Specifically, Claim 1 has been rejected by the Examiner because the terms "such as" and "preferably" are vague and indefinite; Claim 4 has been rejected because its use of the term "preferably" is vague and indefinite; and Claim 12 has been rejected because its use of the expression "if so desired" is vague and indefinite. Claims 2-3, 5-11 and 13 were rejected because they depend from indefinite claim 1. While not agreeing with the bases of these rejections, Applicants have amended Claims 1, 4 and 12 for clarification. In addition, Claim 2 has been amended to correct a typographical error. Accordingly, withdrawal of the rejection of Claims 1, 4 and 12 (and Claims 2-3, 5-11 and 13) under 35 U.S.C. § 112 is respectfully requested.

Claims 1-5 and 7-13 were also rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,454,198 (Fickel et al.) in view of U.S. Patent No. 4,276,179 (Soehngen) and U.S. Patent No. 2,367,384 (Tymstra et al.). This rejection is respectfully traversed.

Fickel et al. disclose a method for removing hydrophobic substances from aqueous systems using porous polypropylene. The particles of Fickel et al. remove the hydrophobic substance by *adsorbing* the substance into the particle pores; Fickel et al. does not disclose the *extraction* of hydrophobic constituents (fuel oil) from an aqueous solution since the fuel oil is not solubilized and is merely adsorbed into Fickel et al.'s empty porous polymers. (See Fickel et al. at column 4, lines 29-31.) Although Fickel et al. mentions that its particles can be wholly or partly filled with active substances, these substances are not used for the extraction of

hydrophobic constituents but instead are used for the long-term release of products, *e.g.*, used in the fields of agriculture and forestry. (See Fickel et al. at column 4, lines 49-68.)

In contrast to the Fickel process, Applicants' extraction method is not limited to fuel oil and *requires* the presence of a hydrophobic material in the pores of the polymer granules to accomplish the extraction process. Only by utilizing polymer particles having hydrophobic material-filled pores can the solubilized hydrophobic constituents be extracted from the aqueous solution. In fact, the Examiner admits that Fickel et al. does *not* disclose the presence of a hydrophobic substance in the pores of the Fickel polymer particles.

Applicants' method also specifically provides for the regeneration of its polymer particles. Here, once again, the Examiner admits that Fickel et al. does *not* disclose the step of regenerating the polymeric material.

To remedy the deficiencies of Fickel et al., the Examiner first asserts that Soehngen teaches impregnating a polyolefinic adsorbent with a hydrophobic liquid or solid in order to enhance the hydrophobic contaminant adsorption capability of the adsorbent material, and thus it would have been obvious to one skilled in the art to immobilize the hydrophobic substance of Soehngen into the pores of Fickel et al. However, there is no teaching or suggestion in either Fickel et al. or Soehngen to fill Fickel et al.'s polymers with Soehngen's liquid. To the contrary, to fill Fickel et al.'s pores would interfere with the absorption of fuel oil into the empty pores. Accordingly, Soehngen does not remedy the deficiencies of Fickel et al.

The Examiner next asserts that Tymstra et al. discloses regenerating an oil adsorbent material with steam, so it would have been obvious to one skilled in the art to regenerate Fickel et al. as modified by Soehngen in order to reuse the modified Fickel et al. material. The skilled person, however, when confronted with Tymstra et al., would not be able to make the connection

with Fickel et al. since Fickel et al. is not using the cationic surface active bonding agent which is the essence of Tymstra et al. Similarly, the skilled person would not make a connection between Tymstra et al. and Soehngen because the definition for Soehngen's liquid and Tymstra et al.'s cationic surface active bonding agents are mutually exclusive (note that the waxes and fatty acids of Soehngen are defined in Tymstra et al. to be anionic and hence cannot be classified as cationic surface active bonding agents). However, even assuming, *arguendo*, that such a combination were made, it is submitted that one skilled in the art would not arrive at the present invention. More particularly, Tymstra et al. discloses a method for removing small quantities of water-immiscible organic oily impurities from water; these impurities may be dispersed as droplets or from an oily film. (See column 1, lines 1-4.) Tymstra et al. uses an inert solid coated with a cationic surface bonding agent to attract the oily impurities, which are then removed from the water. Once the solid has absorbed the oil and been removed from the water "[t]he oil may be removed from the spent solid by steam vaporization, burning, solvent washing ... or by the chemical action of an aqueous solution of an alkali metal hydroxide followed by neutralization with an aqueous acid." (Page 3, left column, lines 19-25.) However, Tymstra et al.'s regeneration process removes the cation bonding agent, which must be reapplied to the substrate before the solid may be reused. "As most regeneration treatments also remove the bonding agent from the solid together with the absorbed oil the regenerated solid must usually be recoated. . . ." (See Tymstra et al. at page 3, left column, lines 43-47.)

Here, unlike Tymstra et al., Applicants' regeneration step does not result in the separation of the hydrophobic substance from the granular or powdery material: only the hydrophobic constituents to be extracted are removed, so there is no need to reapply or reintroduce the hydrophobic substances into Applicants' granular or powdery material after regeneration. (See

Specification, Examples II, III, IV, V.) This is in stark contrast to the regeneration process of Tymstra et al. which anticipates the need to re-apply its bonding agents after the regeneration process in order to reuse its solid substrate material.

Accordingly, as there is no suggestion in Tymstra et al. that its regeneration steps will result in a solid coated with cationic bonding agent that is capable for reuse, Tymstra et al. does not remedy the deficiencies of Fickel et al. Thus, Fickel et al., Soehngen and Tymstra et al. taken alone or in any combination fail to make obvious the present claims. In view of the above, withdrawal of the rejection of claims 1-5 and 7-13 under 35 U.S.C. § 103(a) is respectfully requested.

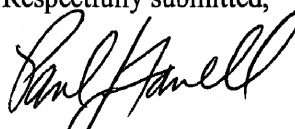
Claim 6 was also rejected by the Examiner under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,454,198 (Fickel et al.) in view of U.S. Patent No. 4,276,179 (Soehngen), U.S. Patent No. 2,367,384 (Tymstra et al.) and further in view of U.S. Patent No. 4,302,337 (Larson et al.). This rejection is respectfully traversed.

Claim 6, which depends from Claim 1, is directed to the use of polystyrene as the hydrophobic substance immobilized in the pores of the granular or powdery material. Larson et al. disclose an apparatus and method for removing organic liquids or oils from an aqueous stream. The aqueous stream is passed through an oil-sorbing bed which includes a foraminous body coated with an oil-imbibing latex coating. (See Larson et al. column 1, lines 60-67.) According to Larson et al., small quantities of oil within the aqueous stream are embedded in the coating, which swells until the oil-swollen latex particles agglomerate into viscous blobs and eventually plugs the filter to which they are attached. Once a filter has been plugged, it must be removed and replaced with a filter having an unswollen latex coating. (See Column 3, lines 14-37.) While Larson et al. discloses that substrates to support the oil imbibing latex coatings can

include open cell polyolefin foams such as polyethylene foam and polypropylene foam, and also that advantageous latex polymers for use as the oil-imbibing coating include polystyrene (column 4, lines 47-51), Larson et al. is silent on regenerating its oil-swelled latex particles or the reuse of the filters to which they are attached. Accordingly, there is no suggestion to combine the polystyrene of Larson et al. with the particles of Fickel et al. or regenerating said particles as taught by Examples II, III, IV and V of Applicants' specification. Therefore, Larson et al., Fickel et al., Soehngen and Tymstra et al., taken alone or in any combination, fail to make obvious claim 6. In view of the above, withdrawal of the rejection of claim 6 under 35 U.S.C. § 103(a) is respectfully requested.

A good faith effort has been made to place the present application in condition for allowance. Reconsideration and allowance by the Examiner of Claims 17-20 and 27 is respectfully requested.

Respectfully submitted,



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AMENDED CLAIMS MARKED TO SHOW CHANGES

1. A method for the extraction of hydrophobic constituents[, such as benzene, toluene, xylene and/or chlorinated hydrocarbons,] from an aqueous solution, involving the steps of:

a. contacting said solution with a porous, [preferably] dimensionally stable granular or powdery material, of which the pores have a size of from 0.1 to 50  $\mu\text{m}$  and contain a hydrophobic substance with affinity for the hydrophobic constituents to be extracted, which granular or powdery material has a particle size of from 0.1 to 10 mm, and is wetted more readily by the hydrophobic substance immobilized in the pores than by the aqueous solution to be treated, and

b. regenerating the product of step a), essentially without the granular or powdery material being freed from the hydrophobic substance, by removal of the hydrophobic constituents.

2. A method according to claim 1[4], wherein steam is used in step b) to remove the hydrophobic constituents.

4. A method according to claim 1, wherein the pore size of the porous, [preferably] dimensionally stable granular or powdery material is from 0.2 to 15  $\mu\text{m}$ .

12. A method according to claim 1, wherein the porous material was obtained by dissolving a polymer in a solvent with heating, cooling the solution, and mechanically reducing the solidified mass [mechanically if so desired].

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